Employment-Based Health Insurance and the Minimum Wage

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Abstract

This paper provides new estimates of the effects of increased federal and state minimum wages on the employment-based health insurance coverage of low-wage workers. I use March Current Population Surveys collected from IPUMS, for 1988 to 2005. Previous studies have found no significant evidence that increased minimum wages reduce fringe benefit receipt (Beeson Royalty 2000; Simon and Kaestner 2003). In contrast to these studies, I use a difference-in-difference approach and I define treatment groups as being individuals in the lowest 1 and 2 deciles of the hourly wage distribution.

Little evidence was found for the federal minimum wage increase of 1990-91, but estimates of the effect of the 1996-97 increase suggest a small negative impact for younger workers and workers in smaller firms. At the state level, I find more suggestive results of a negative impact of the minimum wage increases. New Jersey (1992) and Massachusetts (2000-2001) exhibit negative effects of being in the treatment group on the probability of having employment-based health insurance for most of the specifications, while the results in Oregon (1991) and Connecticut (2000-2001) are more sensitive to the specification. The results suggest that being in the treatment group makes individuals 3 to 4 percentage points less likely to be policyholders of employment-based health insurance compared to the control group.

JEL Classification Codes: J32, J33

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1. Introduction

Health insurance has become an increasingly important topic for researchers, especially since millions of Americans do not have health insurance coverage. Despite the attention given to the lack of employer-provided health insurance and the falling standard of living for those in the lower part of the income distribution, the gap in coverage between those in the upper part of the income distribution and those in the lower part has actually diminished in the recent years. However, the gap in coverage remains large. In 2005, for example, nearly 77 percent of those in the upper wage deciles were covered compared with only 23 percent of those in the lowest wage decile. The narrowing of the coverage gap is due to a combination of both reduced coverage in the upper wage deciles and increased coverage in the lowest wage decile.

The widening income gap between those at the top and those at the bottom that has occurred over the past 25 years was one of the motivations for the recently passed increase in the federal minimum wage. The most frequently cited negative impact of increased minimum wages typically is their presumably negative impact on employment, particularly on those who are newest to the labor force and with the lowest levels of skills. Studies of these impacts are decidedly mixed (Card and Krueger 1994; Neumark and Wascher 1998).

One possible explanation for the failure to find consistently significant effects of minimum wages on employment is that employers are able to adjust on other margins. For example, Wessels (1980) argued that employers would reduce fringe benefits and provide less pleasant working conditions. Beeson Royalty (2000) and Simon and Kaestner (2003) find no significant effects of the minimum wages on fringe benefits for low-skilled workers, both at the state and federal level.[1]

[1] There are two main streams of literature regarding minimum wage laws: one that studies the implications of increases in minimum wages on employment, and another one that explores the relationship between minimum

This paper provides new estimates of the effects of increased federal and state minimum wages on the employment-based health insurance coverage of low-wage workers. Using CPS data from 1988 to 2005 and a difference-in-difference approach, I examine the effects of several increases in the state and federal minimum wage on the coverage rates for policyholders of employer provided health insurance for individuals in the lowest 1 and 2 deciles of the hourly wage distribution. Little evidence was found for the federal minimum wage increase of 1990-91, but estimates of the effect of the 1996-97 increase suggest a small negative impact for younger workers and workers in small firms.

At the state level, I find more suggestive results of a negative impact of the minimum wage increases. New Jersey (1992) and Massachusetts (2000-2001) exhibit negative effects of being in the treatment group on the probability of having employment-based health insurance for most of the specifications, while the results in Oregon (1991) and Connecticut (2000-2001) are more sensitive to the specification. The results suggest that being in the treatment group makes individuals 3 to 4 percentage points less likely to be policyholders of employment-based health insurance compared to the control group.

The paper is organized as follows: Section Two briefly reviews the previous literature; Section Three presents the theoretical background; Section Four includes the data and variables description; Section Five presents the empirical strategy, Section Six shows the main results and Section Seven draws the conclusions.

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wage and the fringe benefits. Among studies related to employment, some of them find negative effect of minimum wages on employment, while other studies find ambiguous or positive effects.

2. Related Studies

2.1. Studies Examining the Minimum Wage Effects on Employment

The difference-in-difference approach I use in my empirical strategy has been used by a number of studies on the employment effects of the increases in the minimum wages. It is the results of such studies, particularly those of Card and Krueger (1994; 1998) that have caused many economists to doubt whether minimum wage laws in the U.S. have had a significant negative impact on employment.

In his recent review of the literature, Brown (1999) noted that as of the early 1980s, there was reasonably broad agreement among economists regarding the employment effects of minimum wages. Much of this agreement was based on time-series studies whose sample periods included the late 1970s. Most studies found significantly negative impacts of the minimum wages on teenagers, group known to have lower levels of formal education and labor market experience. In an earlier review of the literature, Brown et. al. (1982) concluded that the most likely impact of a 10 percent increase in the minimum wage probably reduced teenage employment by between 1 and 3 percent. Yet, Brown (1999) notes that the 1980s may not be a very promising time period during which to identify the employment effects of minimum wages because the federal minimum wage was fixed in nominal terms between 1981 and 1990, and the only variation in the real value of the federal minimum wage arose solely from increases in the overall price level. The more recent time series evidence led researchers to other approaches that make greater use of cross-sectional data (Brown 1999, p. 2121).

Probably the first study that could be characterized as using the difference-in-difference approach to estimate the impact of minimum wages is that of Egge et. al. (1970). This study compared the low-wage and high-wage workers, using individuals paid more than the old level,

but less than the new level of the 1967 minimum wage as the treatment group. Egge et. al. concluded that there is little evidence of negative effect on employment. While defining the treatment group in a similar way to Egge, Currie and Fallick (1996) found an adverse effect of the 1980 and 1981 increases in minimum wage on employment. However, Brown (1999) acknowledges that the 1981 recession may have been "harder on low-wage workers than others", hence the negative effects found by Currie and Fallick (p. 2141), and that "low-wage workers faring well in expansion and poorly in recessions is a tempting conjecture in the absence of obvious alternatives" (p. 2142).

There are more studies that use a difference in difference approach to examine the effects of increases in minimum wages on the low-wage industry employment. Katz and Kruger (1992) examine the effects of 1991 federal minimum wage increase on fast-food restaurants in Texas, and Card and Kruger (1994) examine the 1992 increase in minimum wage in New Jersey. Both papers find no evidence that the fast food restaurants surveyed reduced employment. Card and Krueger (1994) compare low-wage restaurants in New Jersey to those in Pennsylvania, and low-wage and high-wage restaurants in New Jersey. In response to Card and Krueger (1994), Neumark and Wascher (1998) collected their own data from fast food restaurants in New Jersey and Pennsylvania, and found opposite effects of the minimum wages. When using BLS data, Neumark and Wascher find that employment in eating and drinking establishments (not just fast-food restaurants) increased more slowly in New Jersey than in Pennsylvania. Card and Krueger, on the other hand, find that employment in fast-food chains grew insignificantly faster in New Jersey. In his analysis of the literature, Brown (1999) concludes that "it is very hard to reject the hypothesis of no effect" (p. 2138) in both the Texas and the New Jersey examination of the minimum wages.

2.2. Studies Examining Fringe Benefits and the Minimum Wage

Besides studying the effects on employment, Katz and Kruger (1992) and Card and Kruger (1994) also verify if there are non-wage offsets of the increases in the minimum wage. Both studies find no significant changes in the likelihood of receiving fringe benefits after the change in minimum wage took place.

Wessels (1980), Beeson Royalty (2000), and Simon and Kaestner (2003) explore the minimum wages effects on fringe benefits more extensively. Wessels (1980) presents theoretical models and empirical evidence for the effects of minimum wages on wages, employment, fringe benefits and working conditions. He shows that employers are likely to reduce fringe benefits and not to improve working conditions in order to offset part of the increase in wages due to mandated minimum wage laws. Beeson Royalty (2000) examines the effects of the minimum wage increases on the probability that low-skilled workers are eligible for pension benefits, health insurance benefits, and paid sick leave. The study finds a significant reduction in eligibility for pension benefits associated with increases in minimum wage, and less significant results for the effect of the minimum wage increase on health insurance and paid sick leave eligibility. Simon and Kaestner (2003) use data from National Longitudinal Survey of Youth and the Current Population Survey and examine the effects of state and federal changes in the minimum wages on groups likely to be affected by minimum wages. Their results show no significant effects of the minimum wage on fringe benefits for low-skilled workers, at both the state and the federal level.

Most recently, Acemoglu and Pischke (2001) examine the effects of the state and federal increases in minimum wages between 1987 and 1992 on the on-the-job training of low wage workers. Using data from the National Longitudinal Survey of Youth (NLSY), the authors find

no evidence that minimum wages reduce training, and little evidence that they tend to increase training. Same conclusion is also reached by Brown (1999).

3. Theoretical Background

Fringe benefits represent a significant proportion of the total compensation offered by the employers to their employees in return for labor. The theory of optimal fringe benefits puts together the firm's isoprofit curve and the workers' preferences, represented by indifference curves. An indifference curve shows the various combinations of wages and fringe benefits that meet a constant level of utility for the worker. An isoprofit curve shows the possible combinations of wages and fringe benefits that provide a given level of profit for the firm. The indifference curve that is tangent to the isoprofit curve gives the optimal combination of wages and fringe benefits for both the worker and the firm. In the figure below, the optimal combination is (W^*, F^*).

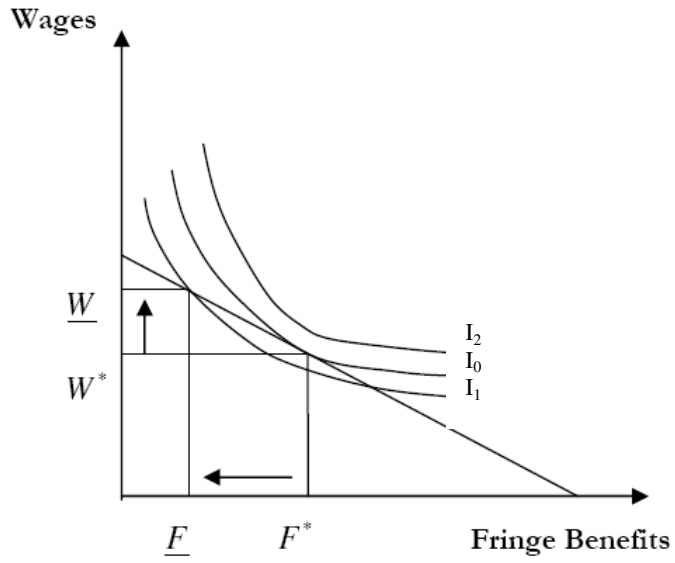

Figure 1: Wage-Fringe Benefits Optimum

Now let's consider the effect of introducing a minimum wage $\underline{W} \geq W^*$ that is binding for all the workers in a firm. The effect on equilibrium wages and fringes depends critically on the product market conditions. For my purposes, it is sufficient to assume that all output is sold at world-determined competitive prices, in which case the firm has no choice but to produce at the same cost, meaning that fringes must be reduced dollar-for-dollar with wages. This situation is depicted in Figure 1. A binding minimum wage forces the firm to move to the left of the original combination of wages and fringes, (W^*, F^*), offering workers a higher wage and a lower level of fringe benefits. Workers, of course, are worse off, their new indifference curve (I_1) passes through the budget constraint where $W = \underline{W}$, and lies below the initial indifference curve (I_0).

Things are more complicated when we add workers with higher wages, not constrained by the minimum wage. Due to nondiscrimination rules, when firms employ both types of workers, they must offer the same level of fringe benefits to all workers. Carrington, McCue and Pierce (2002) show that nondiscrimination rules for firms with different types of workers limit within-firm inequality in preferential tax treatment benefits, but they place no corresponding constraint on within-firm inequality in wages. The authors assume that there are two types of workers in the labor market: blue-collar and white-collar. Workers have Cobb-Douglas preferences over wages (W) and fringe benefits (F):

$$U(W,\ F)\ = W^{\alpha} F^{1-\alpha}.$$

There are three sectors in the economy: (*a*) a blue-collar sector with completely elastic demand for blue-collar labor, (*b*) a white-collar sector with completely elastic demand for white-collar labor, and (*c*) a mixed sector where blue-collar and white-collar workers are employed in

equal proportions.[2] In what follows, I shall use lower-case subscripts to denote the type *t* of worker and upper-case superscripts to denote the sector *S*:

B = blue collar,

W = white collar,

and *M* = mixed.

Thus, if the utility level of type-*t* workers in sector *S* is equal to U_t^S, then cost minimization by firms leads workers of type *t* to earn wages equal to $W_t^S = U_t^S[\alpha/(1-\alpha)]^{1-\alpha}$ and fringe benefits $F_t^S = U_t^S[\alpha/(1-\alpha)]^{-\alpha}$.

Carrington et. al. assumed that blue and white-collar workers are used in fixed proportions of one-to-one. I modify this assumption only slightly by assuming that a unit mass of workers is employed, where a proportion *p* is white-collar and a proportion 1-*p* is blue-collar. The firm therefore minimizes

$$pW_w^M + (1-p)\underline{W} + F^M$$

To see how the firm solves its problem, note that the firm could offer all workers the same level of fringe benefits as exists in equilibrium in the blue-collar sector, $\underline{F}^M = \underline{F}_b^B \ll F^M$, but in order to attract white-collar workers, would have to raise the white-collar wage to

$$\tilde{W}_W^M = \left(U_w^W \left(\underline{F}_b^B\right)^{a-1}\right)^{1/\alpha}$$

In the limit, if the firm employs a large number of blue-collar workers this would be, approximately, the cost-minimizing wage rate for the white-collar workers. If, however, the firm employs a large number of white-collar workers, then it may want to offer a higher level of fringe benefits to its workers, thereby offering blue-collar workers a wage-fringes package with a

[2] Labor demand is given by a monotonically negative function $G(W_b + W_w + F_b + F_w)$, $G'(-) < 0$.

higher level of utility than that available in the blue-collar sector.[3] When allowing for fringes to be higher in the mixed sector than in the blue-collar sector, the solutions to the minimization problem are:

$$W_w^M = \left(\frac{1}{p} \frac{\alpha}{1-\alpha} \right)^{1-\alpha} U_w^W$$

and

$$\underline{F}^M = \left(p \frac{1-\alpha}{\alpha} \right)^{\alpha} U_w^W$$

The higher the share of the white-collar workers, the lower the increase in their wages, and the higher the level of fringe benefits is. This implies that a firm using a high share of white-collar workers will keep the level of fringes offered to all workers at a relatively high level, and it will not be forced to increase the white-collar workers' wages too much. For a given minimum wage, the lower the share of white-collar workers, the lower the level of fringe benefits, and therefore, the higher the decrease in fringe benefits in the mixed sector is.

The fringe benefits fall for all workers in the blue-collar sector and in the mixed sector, but the magnitude of the effects depends on the level of the minimum wage. The change in the fringe benefits for blue-collar sector equals the increase in wages, in absolute value, and it is given by the formula:

$$\Delta F_b^B = -\Delta W = U_b^B \left(\frac{1-\alpha}{\alpha} \right) - \underline{W}$$

The change in the fringe benefits for blue-collar workers in the mixed sector is expressed in terms of utilities for both blue-collar and white-collar workers, and is given by the formula:

[3] If costs rise above the world price for the mixed firms, they will disappear, leaving only blue-collar and white-collar firms. If, however, the mixed firms can pass some of the increase in costs onto consumers, then some, but not all mixed firms will survive. There are a number of ways to get around this counterfactual, including introducing a downward-sloping demand curve for the output produced in each sector. Extending the model to this case would introduce considerable algebraic complexity and shed comparatively little additional light on the question at hand. I therefore leave this exercise for future research. One can view the exercise worked out here as being relevant for the short run in which resources are not mobile across sectors.

$$\Delta F^{M} = \underline{F^{M}} - F^{M} = \left(\frac{1-\alpha}{\alpha}\right)^{\alpha}\left[p^{\alpha}U_{w} - (\frac{1-p}{k})^{1-\alpha}\left(U_{b}\right)^{1/\alpha} - \left(\frac{p}{k}\right)^{1-\alpha}\left(U_{w}\right)^{1/\alpha}\right]$$

where

$$\underline{F^{M}} = \left[\frac{p(1-\alpha)}{\alpha}\right]^{\alpha} U_{w},$$

$$F^{M} = \left(\frac{1-\alpha}{\alpha}\right)^{\alpha}\left[(\frac{1-p}{k})^{1-\alpha}\left(U_{b}\right)^{1/\alpha} + \left(\frac{p}{k}\right)^{1-\alpha}\left(U_{w}\right)^{1/\alpha}\right]$$

and $k = (1-p)\left(U_{b}\right)^{1/\alpha} + p\left(U_{w}\right)^{1/\alpha}$

When comparing the changes in fringe benefits between the blue-collar and the mixed sector, the expression becomes more complex:

$$\Delta F_{b}^{B} - \Delta F^{M} = U_{b}^{B}\left(\frac{1-\alpha}{\alpha}\right) - \left(\frac{1-\alpha}{\alpha}\right)^{\alpha}\left[p^{\alpha}U_{w} - (\frac{1-p}{k})^{1-\alpha}\left(U_{b}\right)^{1/\alpha} - \left(\frac{p}{k}\right)^{1-\alpha}\left(U_{w}\right)^{1/\alpha}\right] - \underline{W}$$

Whether this expression is positive or negative depends on the original utility levels for blue-collar and white-collar workers, on their share in the mixed sector, and on the level of the minimum wage.

If $U_{b}^{B}\left(\frac{1-\alpha}{\alpha}\right) - \left(\frac{1-\alpha}{\alpha}\right)^{\alpha}\left[p^{\alpha}U_{w} - (\frac{1-p}{k})^{1-\alpha}\left(U_{b}\right)^{1/\alpha} - \left(\frac{p}{k}\right)^{1-\alpha}\left(U_{w}\right)^{1/\alpha}\right] \ll \underline{W}$,

then the decrease in fringe benefits is higher in the blue-collar sector than in the mixed sector.

However, if $U_{b}^{B}\left(\frac{1-\alpha}{\alpha}\right) - \left(\frac{1-\alpha}{\alpha}\right)^{\alpha}\left[p^{\alpha}U_{w} - (\frac{1-p}{k})^{1-\alpha}\left(U_{b}\right)^{1/\alpha} - \left(\frac{p}{k}\right)^{1-\alpha}\left(U_{w}\right)^{1/\alpha}\right] \gg \underline{W}$,

then the decrease in fringe benefits is higher in the mixed sector than in the blue-collar sector.

Brown (1999) noted that "as long as the minimum wage is set low enough that it affects only a small share of employment, the effect of the minimum wage on total employment is likely to be small and in any case swamped by other factors. Thus, it makes sense to focus on the

analysis of low-wage groups, where the proportion directly affected is larger and so the anticipated effect on group employment is likely to be larger".

Although it is hard to clearly separate blue-collar workers from white-collar workers in the real world, I do associate low-skilled individuals with the blue-collar workers, and the rest of the population with the white-collar workers. As a measure of low skills I use the bottom 10% and bottom 20% wage earners, and I examine whether there are any differences in their probability of being a policyholder of employment-based health insurance compared to the other workers after a binding minimum wage is imposed.

4. Data and Variable Description

For my research purpose I use March Current Population Survey (CPS) data extracted from the IPUMS-CPS database. CPS is a monthly survey of about 50,000 households conducted by the Bureau of the Census for the Bureau of Labor Statistics. The survey is the primary source of information on the labor force characteristics of the U.S. civilian non-institutional population, as well as basic demographic files of household, family, and individuals, such as age, sex, race, marital status, educational attainment, annual income, work related variables. The sample period in this paper is 1987 to 2004. Individuals in armed forces are excluded from my analysis, as well as those younger than 18 and older than 64 years. Descriptive statistics are presented in Appendix A, Table A.1. The total number of observations is 1,259,587 at the federal level, 2,769 observations in Oregon, 9,101 in New Jersey, 4,642 in Connecticut, and 6,365 in Massachusetts, but the actual sample size varies depending on the specification.[4]

[4] The case studies analyzed at the federal level are the 1990-91 minimum wage change, the 1996-97 minimum wage change, and one that combines these two changes. In choosing the case studies at the state level, I select the states with increases in minimum wages at a higher level than the federal minimum wage, and than the neighboring states.

Hourly wage is defined as the total wage income in the previous year divided by the product of usual hours worked per week and usual number of weeks worked last year. In order to get reliable estimates for my analysis, I set as missing all observations with allocated values for total wage income, usual hours worked per week and number of weeks worked, as well as for other variables used. Wages are indexed using 2005 CPI to make data comparable over time. I also restrict the sample to workers who earn an hourly wage equal at least to 50% of the federal minimum wage and less than $337.50, which represents the lower limit for the 90th percentile of the 99th percentile of hourly wage. I define deciles and quintiles of hourly wages, by year, to break the coverage rates into these groups. The wage deciles and wage quintiles are used to define the treatment and control groups in my empirical analysis.

The health insurance variable used in this study is the policyholder of employment-based health insurance. In constructing the variable, I start from individuals who have private coverage, and then I exclude those who privately purchased health insurance coverage and those who did not have health insurance in their own name. I set as missing all the observations with allocated values for the variables used and for the unemployed population.

The average coverage rates for the employer-provided health insurance are 57 percentage points at the federal level and 60.1 percentage points in Oregon, 61.9 percentage points in New Jersey, 59.9 in Connecticut, and 57.1 percentage points in Massachusetts, respectively. Average real hourly wage is $18.93 at the federal level, $17.57 in Oregon, $21.45 in New Jersey, $24.79 in Connecticut, and $23.54 in Massachusetts. Nominal and real federal and state minimum wage

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At the state level, the cases analyzed are: Oregon (1991), New Jersey (1992), Massachusetts (2000-2001) and Connecticut (2000-2001).

averages are also included in the summary statistics, as well as average real wages for workers in the bottom two deciles of the wage distribution, which are $4.97 and $6.2 respectively.

Whites represent 73.2 percent of the entire population; Blacks represent 8.9 percent, and Hispanics 13.1percent. At the state level races are represented as follow: 90.3 percent Whites, one percent Blacks, and 5.5 percent Hispanics in Oregon; 70.3 percent Whites, 9.5 percent Blacks, and 15.2 percent Hispanics in New Jersey; 76.2 percent Whites, 10.8 percent Blacks, and 10.7 percent Hispanics in Connecticut; 81.8 percent Whites, 6.7 percent Blacks, and 7.7 percent Hispanics in Massachusetts.

Approximately one third of the entire population has a high school diploma, 27.2 percent of the population attended some college, while 26.5 percent have graduated from college or have a higher degree. At the state level, the percentage of population who earned at least a college degree is higher than the overall percentage at the federal level, especially in New Jersey, Connecticut and Massachusetts, at 33.8, 36.2 and 38.3 percent respectively. Other control variables used are geographic regions, firm size and occupation dummies. Health insurance coverage rates by firm size, occupation and industry are presented in Appendix A, tables A.2 to A.4.

5. Empirical Strategy

I use a difference-in-difference (DD) approach to assess the impact of the minimum wage on the employer-provided health insurance, a method used by other studies as well, especially those examining the employment effects of minimum wages. For increases in the state minimum wage I also use a difference-in-difference-in-difference (DDD) method. DD estimation is a commonly used empirical technique in economics, it implies that there is a treatment group and a

control group for which outcomes are compared before and after a change that affects only the treatment group:

$$(HI_{t,Treatm} - HI_{t-1,Treatm}) - (HI_{t,Control} - HI_{t-1,Control})$$

This method has some limitations, as mentioned by Bertrand, Duflo, Mullainathan (2004). The authors note that the presence of serial correlation can lead conventional DD estimates to understate the true standard deviation of the estimated treatment effects, thus leading to overestimated t-statistics and significance levels. One possible solution is to collapse the data into pre- and post-periods and to cluster the standard errors at the appropriate level (e.g., state). Another difficulty is that DD estimates are sensitive to the choice of the pre- and post-periods as well as to the definition of the treatment and control groups (Brown 1999). Both at the federal level and at the state level, I use two treatment groups, bottom 10% and bottom 20% wage earners.

My study differs in a number of ways from that of both Beeson Royalty (2000) and Simon and Kaestner (2003). In contrast to Beeson Royalty (2000), who examined changes in eligibility for health insurance, I examine changes in actual coverage rates. Beeson Royalty (2000) captures the estimated effects of minimum wages with a variable that measures the real value of the federal or state minimum wage, whereas I use a dummy variable to indicate changes in federal or state minimum wage legislation. Beeson Royalty (2000) analyzed only the 1988-1993 period, while my analysis spans over a longer period of time, and is separated into six case studies, early and late 1990s at the federal level, and Oregon, New Jersey, Connecticut and Massachusetts at the state level. As a measure of low-skilled workers, the Beeson Royalty uses workers who earn less than $7 per hour or who have less than 12 years of education, while I

define two treatment groups including individuals in the lowest 1 and 2 deciles of the hourly wage distribution.

In contrast to Simon and Kaestner (2003), who use a quasi DD technique, I use a true DD estimation and allow for all the control variables to vary among low-wage and high-wage earners. Second, I explore the changes in the employment-based health insurance by wage groups and by demographic groups, while Simon and Kaestner explore general variation in health insurance and pension provision for all individuals. Third, I define different treatment groups than the authors.[5]

There were several changes in the federal minimum wage during the period analyzed: the federal minimum wage increased to $3.80 in April 1990 from its previous level of $3.35, and to $4.25 in 1991. Two more increases took place in October 1996 and in September 1997, to $4.75 and $5.15.[6]

The CPS questions referring to labor and income are retrospective. Hence, there is a lag between the actual change in minimum wage and the year reflected in my data.[7] To simplify the interpretation of results, I mention the actual year of change. For each federal minimum wage increase I compare a three-year period after the change with a three-year period before the

[5] Simon and Kaestner use individuals that are earning less than $4, those earning between $4 and $5, and those earning between $5 and $8 per hour as comparison groups, while my treatment groups are bottom 10% and bottom 20% wage earners.

[6] A concern about the changes in federal minimum wage comes from the fact that the changes took place in consecutive years: 1990, 1991 and 1996, 1997. This may lead to overlapping of the effects of minimum wage changes on the health insurance coverage rates. In trying to solve this shortcoming, I combine the changes in just two: 1990-91 change and 1996-97 respectively. I also have a specification of the model where I look at both changes, and I compare the period after any of the two changes in the federal minimum wage with the period before the changes occurred.

[7] The change that took place in 1990 is reflected as taking place in 1991 in my data, while the 1991 change is actually reflected in 1992 data. Since the last two changes took place toward the end of 1996 and 1997, I consider that they had an effect on the variables in the next year. Therefore, there is a two-year lag between the year reflected in my data for the last two changes and the year when the actual change took place.

change, while at the state level I use two years before and two years after the increase in the minimum wage. A history of the changes in the federal and state minimum wages is attached in the Appendix A, Table A.5.

In order to determine the case studies at the state level I examine all the changes in the state minimum wages along the period. In the 1990s several increases in the state minimum wages were just adjusting to the federal minimum wage level, while only a few states had higher increases than the federal minimum wage level. In the most recent years more states moved ahead and increased their minimum wage requirements above the federal level.[8] I expect to find evidence of the effect of increases in the state minimum wages on health insurance coverage rates mostly in states that had new levels of the minimum wage greater than the federal minimum wage and greater than the minimum wages in the neighboring states. Hence, there are just four case studies selected to be analyzed: Oregon (1991), New Jersey (1992), Massachusetts (2000-2001) and Connecticut (2000- 2001). I use four years of data, two years before and two years after the state minimum wage change. A description of the state case studies is included in Appendix A, tables A.7 to A.10.

I estimate the following regressions:

(1) $$P(HI=1) = f(\beta_0 + \beta_1 Treatment + \beta_2 After + \beta_3 After * Treatment + \beta\ X)$$

and

(2) $$P(HI=1) = f(\beta_0 + \beta_1 State + \beta_2 Treatment + \beta_3 After + \beta_4 State * Treatment + \beta_5 State * After + \beta_6 After * Treatment + \beta_7 State * Treatment * After + \beta\ X)$$

[8] In 2005, 17 states had higher minimum wages than federal minimum wage, one state had a lower minimum wage, 25 states had the same level of minimum wage as the federal level, and seven states did not have minimum wage laws.

where HI is a health insurance dummy variable equal to one if the individual is a policyholder of employment-based health insurance, and equal to zero otherwise; $Treatment$ is a dummy variable for the treatment group (bottom 10% or bottom 20% wage earners); $After$ is a period dummy, $State$ is a dummy variable equal to 1 if the individual lives in the state with the increase in minimum wage, and zero otherwise, and X is a vector of demographic and firm specific characteristics. The impact of the increase in federal minimum wage on the change in the employer-provided health insurance coverage is captured by the interaction term between the period and the treatment group dummies. At the state level, the impact of the increase in the minimum wage is reflected by β_7. To account for macroeconomic differences among states, I control for the unemployment rate at the state level using March unemployment rates for each state and each year. The regressions weighted using individual weights.

Along with estimating probit regression, I estimate the probability of being a policyholder of employment-based health insurance and the difference in these probabilities between the treatment group and the control group. The standard errors are calculated using two hundred bootstrap replications.

The bootstrap is a type of Monte Carlo simulation which requires little additional programming besides the program code for the actual model. As noted in Cameron and Trivedi (2005), the bootstrap is useful in computing standard errors when analytical formulas are complex (pp. 255). The procedure involves choosing random samples with replacement from a data set and analyzing each sample the same way. A bootstrap distribution approximates the sampling distribution of the statistic and it is used as a way to estimate the variation in a statistic based on the original data. Bootstrap distributions imitate the shape, spread, and bias of sampling distributions. Almost all of the variation among bootstrap distributions for a statistic is due to the

selection of the original random sample from the population, resampling introduces little additional variation. The bootstrap can estimate the sampling distribution, bias, and standard error of a wide variety of statistics. The bootstrap standard error of a statistic is the standard deviation of its bootstrap distribution; it measures how much the statistic varies under random sampling.

The advantage of bootstrapping over analytical methods is its great simplicity; it is straightforward to apply the bootstrap to derive estimates of standard errors and confidence intervals for complex estimators of complex parameters of the distribution. However, there are some disadvantages as well: while under some conditions it is asymptotically consistent, it does not provide general finite sample guarantees, and has a tendency to be overly optimistic.

6. Results

The estimates of the probability of being policyholder of employment-based health insurance after changes in minimum wage take place at the federal level and at the state level are presented in Tables 1 to 6. Along with estimating the probability of being insured for everyone I examine different groups of workers: individuals younger than 40, individuals working in small size firms, and young individuals working in small firms. I also examine the variation in the probabilities by race and ethnicity.

Table 1 includes the probability of being policyholder of employment-based health insurance after 1990-91 changes in the federal minimum wage and the difference in these probabilities between the treatment and the control group. Regardless of the treatment group, bottom 10 or bottom 20% wage earners, almost all the specifications suggest that being in the treatment group after the 1990-91 changes in the federal minimum wage does not have a negative impact on one's probability of having employment-based health insurance in owns

name. The only exception in the early 90s comes from the race group Others. The difference-in-difference coefficients suggest that being in the bottom 10% or bottom 20% wage earners makes an individual 2.7 and 1 percent less likely to be a policyholder compared to the control group, non-bottom 10% and non-bottom 20% wage earners respectively. Among the workers included in the treatment group predicted probabilities of being insured vary from 11 percentage points for young adults working in small firms to 32 percentage points for Blacks before the increase in minimum wage, and from 10.5 percentage points for young adults working in small firms to 30.8 percentage points for Blacks after the increase in minimum wage. The estimated probabilities of being insured among the control group are, not surprisingly, much higher, around 33-35 percentage points for young workers and those working in small firms, and around 55-65 percentage points for everybody else.

Estimates of the impact of the 1996-97 changes in the federal minimum wage on the probability of being a policyholder of employment-based health insurance among treatment and control groups are presented in Table 2. While in the early 90s only the difference-in-difference coefficient for Others suggested a negative impact of the minimum wage changes, in the late 90s the probability of being policyholder of employment-based health insurance is negatively affected for small size firms, for young adults as well as for Others. The workers in the treatment group have predicted probabilities of being insured of about 20 to 30 percentage points, while the probabilities for the workers in the control group span from 30 to 65 percentage points. The predicted probabilities are not too far off from the actual coverage rates along the period. Details about the sample size for each case study and the actual coverage rates through employment-based health insurance are presented in Appendix B, tables B.1 to B.6, corresponding to tables 1 to 6.

In a recent article, Abraham, DeLeire and Beeson Royalty (2007) estimate the provision of several components of the compensation package in the small firms, and conclude, among other, that "workers employed at small firms are substantially less likely to be offered health insurance than those at larger firms." In this context, I obtain similar estimates for the workers in small firms after the 1996-97 minimum wage change. The difference-in-difference coefficient implies that being in the treatment group makes an individual about one to three percentage points less likely to have health insurance through employer compared to the control group. Standard errors are larger than the coefficients making the results not very strong.

The results at the state level are presented in separate tables for each case study. The difference-in-difference coefficients for the Oregon increase in the minimum wage, included in Table 3, suggest a negative impact of being in the bottom 10% wage earners for everyone, for young workers, for individuals working in small firms, and for Whites. However, the results are opposite when the treatment group is defined as bottom 20% wage earners. The gap in predicted probabilities of being insured as well as the gap between the actual coverage rates for the control and treatment group are bigger for bottom and non-bottom 10% wage earners compared to bottom and non-bottom 20% wage earners.

Table 4 includes the estimated probabilities of being policyholder of employment-based health insurance before and after the New Jersey increase in minimum wage. The predicted probabilities of being insured vary roughly between 15 and 30 percentage points among the treatment group, and between 35 and 55 percentage points for the control group. No matter what the treatment group is, the New Jersey minimum wage increase has a negative impact on the probability of being insured for the treatment group compared to the control group. The difference-in-difference coefficients are suggestive, but not statistically significant. For example,

being in the bottom 10% wage earners makes a White individual 3.7% less likely to be a policyholder of employment-based health insurance than a White non-bottom 10% wage earner. Similarly, being in the bottom 20% wage earners makes a White individual 1.6% less likely to have health insurance coverage through employer than a White worker in the control group.

The difference-in-difference coefficients for the Connecticut increase in the minimum wage and the estimates of the predicted probabilities of having health insurance through the employer are displayed in Table 5. Approximately half the specifications suggest a negative impact of being in the treatment group. While the predicted probabilities are lower after the increase in minimum wage, both for the treatment group and the control group, in some specifications the negative impact of the increase is higher for the workers paid lower wages.

Table 6 contains more consistent difference-in-difference estimates for the Massachusetts increase in minimum wage. These estimates vary between 3 and 41 percentage points, with the extremes obtained for young individuals in the bottom two hourly wage deciles, and for Blacks in the first decile. The sample size varies along the period making the interpretation of the results a little difficult because part of the estimated change in the probability may simply occur due to this.

The 1990-91 minimum wage changes at the federal level, as well as the state level change in Oregon exhibit a positive effect on the coverage rates of employment-based health insurance for most of the specifications, even when I control for the unemployment rate. A possible explanation for this may be that the economy is recovering after a severe recession and the unemployment rate may not capture all the changes in the economy. At the state level, some of the marginal effects are very high; this may be due, in part, to the small sample size in the regressions.

Another possible explanation for the positive effects of increases in minimum wage on the coverage rates of employment-based health insurance is that big firms are more likely to adjust on the margin of co-pay. I observe whether an individual is covered or not by employment-based health insurance through employer, but I have no information on how much the employer and the employee are paying, or on the health insurance package. It may be the case that employers would raise the price of insurance rather than dropping coverage in response to a minimum wage increase. In this context, my results should be considered a lower bound of the effect.

Also, to the extent that the share of low wage workers changes within the firms after a change in minimum wage takes place, it may be harder to identify the negative effect of this increase on the fringe benefits offered to low wage workers. This may bias the results by understating the true effect.

7. Conclusions

General studies regarding the variation in health insurance coverage rates over time suggest that the decline in health insurance coverage may be caused by an increase in the Medicaid eligibility, an economic recession, or an increase in the premiums that individuals have to pay. Studies which examined the relationship between the minimum wage and the fringe benefits failed to provide evidence that increased minimum wages reduce the fringe benefit receipt. Most of the previous literature has focused on the employment effects of the minimum wage, while the effects on the provision of fringe benefits were understudied by the researchers.

Using CPS data from 1988 to 2005, I examine the effects of minimum wage increases on the probability of having employment-based health insurance for bottom 10% and bottom 20% wage earners, compared to non-bottom 10% and non-bottom 20% wage earners.

At the federal level I find some evidence that employees in small firms, especially the younger ones, were negatively affected by changes in minimum wage that occurred in the late 1990s but not in the earlier 1990s. At the state level I analyze four case studies, Oregon (1991), New Jersey (1992), Connecticut (2000-2001) and Massachusetts (2000-2001), and I find more suggestive results of a negative impact of the minimum wage increases. New Jersey and Massachusetts exhibit negative effects of being in the treatment group on the probability of having employment-based health insurance for most of the specifications, while the results in Oregon and Connecticut are more sensitive to the specification. The results suggest that being in the treatment group makes individuals 3 to 4 percentage points less likely to be policyholders of employment-based health insurance compared to the control group.

Future research may extend the case studies to the new increases in the federal minimum wage, which take place starting with the summer of 2007. It may also expand the analysis to include more fringe benefits, besides the employment-based health insurance.

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Results

Table 1: 1990-91 Federal Minimum Wage Change and Estimated Predicted Coverage by Employment-Based Health Insurance.

		Treatment		Control			
Sample	**Wage**	**Before**	**After**	**Before**	**After**	**DD**	**St. Err**
Everyone	**10%**	0.199	0.200	0.616	0.596	0.021	0.007
Age<40	**10%**	0.177	0.178	0.587	0.561	0.028	0.009
Fsize25	**10%**	0.127	0.129	0.335	0.324	0.015	0.010
Fsize25 &age	**10%**	0.114	0.105	0.331	0.316	0.003	0.012
White	**10%**	0.203	0.206	0.629	0.612	0.021	0.009
Black	**10%**	0.222	0.241	0.635	0.599	0.060	0.023
Hispanic	**10%**	0.170	0.153	0.522	0.489	0.009	0.018
Other	**10%**	0.199	0.198	0.553	0.578	-0.027	0.039
Everyone	**20%**	0.273	0.261	0.642	0.623	0.005	0.005
Age<40	**20%**	0.249	0.234	0.619	0.594	0.009	0.006
Fsize25	**20%**	0.160	0.157	0.352	0.340	0.008	0.007
Fsize25&age	**20%**	0.150	0.142	0.352	0.336	0.005	0.009
White	**20%**	0.274	0.267	0.653	0.636	0.009	0.006
Black	**20%**	0.327	0.308	0.662	0.631	0.010	0.015
Hispanic	**20%**	0.235	0.212	0.561	0.527	0.007	0.013
Other	**20%**	0.246	0.260	0.579	0.605	-0.010	0.024

Note: Each line represents a separate regression.

Table 2: 1996-97 Federal Minimum Wage Change and Estimated Predicted Coverage by Employment-Based Health Insurance.

		Treatment		Control			
Sample	**Wage**	**Before**	**After**	**Before**	**After**	**DD**	**St. Err**
Everyone	**10%**	0.234	0.242	0.606	0.599	0.016	0.007
Age<40	**10%**	0.197	0.205	0.557	0.555	0.012	0.009
Fsize25	**10%**	0.152	0.142	0.339	0.335	-0.008	0.010
Fsize25 &age	**10%**	0.124	0.120	0.318	0.318	-0.005	0.013
White	**10%**	0.242	0.250	0.626	0.619	0.016	0.009
Black	**10%**	0.293	0.327	0.616	0.633	0.020	0.021
Hispanic	**10%**	0.190	0.186	0.500	0.486	0.010	0.014
Other	**10%**	0.261	0.221	0.600	0.554	-0.001	0.033
Everyone	**20%**	0.288	0.295	0.631	0.623	0.016	0.005
Age<40	**20%**	0.249	0.258	0.588	0.585	0.013	0.006
Fsize25	**20%**	0.181	0.168	0.354	0.351	-0.013	0.008
Fsize25&age	**20%**	0.158	0.148	0.338	0.338	-0.014	0.010
White	**20%**	0.296	0.302	0.647	0.640	0.015	0.006
Black	**20%**	0.344	0.385	0.642	0.656	0.028	0.015
Hispanic	**20%**	0.250	0.242	0.534	0.522	0.004	0.010
Other	**20%**	0.307	0.268	0.624	0.578	0.003	0.025

Note: Each line represents a separate regression.

Table 3: Oregon Minimum Wage Change and Estimated Predicted Coverage by Employment-Based Health Insurance.

		Treatment		Control			
Sample	**Wage**	**Before**	**After**	**Before**	**After**	**DD**	**St. Err**
Everyone	**10%**	0.175	0.148	0.483	0.504	-0.054	0.079
Age<40	**10%**	0.074	0.091	0.269	0.306	-0.012	0.078
Fsize25	**10%**	0.173	0.155	0.450	0.459	-0.029	0.098
Fsize25 &age	**10%**	0.093	0.102	0.268	0.274	0.007	0.114
White	**10%**	0.212	0.171	0.540	0.568	-0.078	0.089
Black	**10%**	-	-	-	-	-	-
Hispanic	**10%**	0.190	0.238	0.443	0.329	0.164	0.313
Other	**10%**	-	-	-	-	-	-
Everyone	**20%**	0.220	0.269	0.502	0.517	0.035	0.055
Age<40	**20%**	0.098	0.167	0.285	0.322	0.050	0.056
Fsize25	**20%**	0.217	0.292	0.474	0.476	0.075	0.063
Fsize25&age	**20%**	0.105	0.167	0.289	0.290	0.075	0.086
White	**20%**	0.251	0.289	0.553	0.579	0.015	0.064
Black	**20%**	0.000	0.640	0.484	0.509	0.575	0.181
Hispanic	**20%**	0.297	0.331	0.475	0.341	0.168	0.168
Other	**20%**	0.129	0.166	0.447	0.484	0.002	0.242

Note: Each line represents a separate regression.

Table 4: New Jersey Minimum Wage Change and Estimated Predicted Coverage by Employment-Based Health Insurance.

		Treatment		Control			
Sample	**Wage**	**Before**	**After**	**Before**	**After**	**DD**	**St. Err**
Everyone	**10%**	0.197	0.198	0.524	0.527	-0.002	0.052
Age<40	**10%**	0.135	0.157	0.370	0.377	0.022	0.070
Fsize25	**10%**	0.184	0.174	0.492	0.491	-0.011	0.066
Fsize25 &age	**10%**	0.149	0.123	0.363	0.363	-0.037	0.100
White	**10%**	0.197	0.170	0.560	0.563	-0.037	0.065
Black	**10%**	0.234	0.322	0.481	0.481	0.083	0.152
Hispanic	**10%**	0.196	0.218	0.363	0.349	0.033	0.117
Other	**10%**	0.151	0.235	0.442	0.480	0.052	0.258
Everyone	**20%**	0.276	0.254	0.533	0.540	-0.029	0.028
Age<40	**20%**	0.176	0.165	0.382	0.398	-0.029	0.054
Fsize25	**20%**	0.237	0.235	0.505	0.508	-0.005	0.038
Fsize25&age	**20%**	0.150	0.134	0.382	0.389	-0.029	0.068
White	**20%**	0.255	0.246	0.570	0.575	-0.016	0.043
Black	**20%**	0.385	0.301	0.483	0.497	-0.088	0.084
Hispanic	**20%**	0.272	0.264	0.370	0.360	0.005	0.058
Other	**20%**	0.187	0.202	0.447	0.501	-0.037	0.159

Note: Each line represents a separate regression.

Table 5: Connecticut Minimum Wage Changes and Estimated Predicted Coverage by Employment-Based Health Insurance.

		Treatment		Control			
Sample	**Wage**	**Before**	**After**	**Before**	**After**	**DD**	**St. Err**
Everyone	**10%**	0.215	0.201	0.509	0.523	-0.031	0.092
Age<40	**10%**	0.199	0.087	0.328	0.368	-0.190	0.164
Fsize25	**10%**	0.168	0.122	0.442	0.459	-0.078	0.118
Fsize25 &age	**10%**	-	-	-	-	-	-
White	**10%**	0.267	0.188	0.556	0.569	-0.112	0.104
Black	**10%**	0.205	0.232	0.490	0.504	0.016	0.177
Hispanic	**10%**	0.115	0.164	0.367	0.377	0.047	0.166
Other	**10%**	0.000	0.406	0.402	0.452	0.439	0.138
Everyone	**20%**	0.229	0.285	0.526	0.537	0.050	0.060
Age<40	**20%**	0.186	0.185	0.348	0.389	-0.040	0.108
Fsize25	**20%**	0.181	0.243	0.460	0.473	0.057	0.075
Fsize25&age	**20%**	-	-	-	-	-	-
White	**20%**	0.291	0.292	0.570	0.580	-0.009	0.069
Black	**20%**	0.180	0.284	0.509	0.516	0.102	0.115
Hispanic	**20%**	0.093	0.241	0.382	0.388	0.147	0.100
Other	**20%**	0.298	0.336	0.419	0.465	-0.013	0.380

Note: Each line represents a separate regression.

Table 6: Massachusetts Minimum Wage Changes and Estimated Predicted Coverage by Employment-Based Health Insurance.

		Treatment		Control			
Sample	**Wage**	**Before**	**After**	**Before**	**After**	**DD**	**St. Err**
Everyone	**10%**	0.246	0.194	0.523	0.520	-0.062	0.059
Age<40	**10%**	0.224	0.160	0.352	0.351	-0.081	0.096
Fsize25	**10%**	0.177	0.103	0.449	0.453	-0.106	0.074
Fsize25 &age	**10%**	0.173	0.049	0.321	0.318	-0.176	0.112
White	**10%**	0.233	0.216	0.559	0.561	-0.025	0.076
Black	**10%**	0.538	0.082	0.484	0.433	-0.414	0.151
Hispanic	**10%**	0.152	0.127	0.348	0.375	-0.056	0.151
Other	**10%**	0.156	0.379	0.457	0.466	0.246	0.264
Everyone	**20%**	0.309	0.232	0.539	0.536	-0.084	0.039
Age<40	**20%**	0.195	0.169	0.371	0.371	-0.031	0.068
Fsize25	**20%**	0.263	0.149	0.466	0.471	-0.136	0.057
Fsize25&age	**20%**	0.186	0.083	0.342	0.343	-0.139	0.079
White	**20%**	0.304	0.258	0.573	0.576	-0.056	0.053
Black	**20%**	0.571	0.125	0.499	0.441	-0.370	0.113
Hispanic	**20%**	0.104	0.151	0.364	0.386	0.031	0.079
Other	**20%**	0.314	0.428	0.480	0.489	0.107	0.218

Note: Each line represents a separate regression.

Appendix A

Descriptive Statistics and Case Studies Description

Table A.1: Descriptive Statistics

	Federal		OR		NJ		CT		MA	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Year	1996	5.419	1991	1.565	1992	1.582	2001	1.864	2001	2.054
Health Insurance Variable	0.573	0.495	0.601	0.49	0.619	0.486	0.599	0.49	0.571	0.495
Male	0.526	0.499	0.533	0.499	0.532	0.499	0.498	0.5	0.503	0.5
Female	0.474	0.499	0.467	0.499	0.468	0.499	0.502	0.5	0.497	0.5
Married	0.625	0.484	0.67	0.47	0.616	0.486	0.648	0.478	0.588	0.492
Number of children	0.991	1.179	0.949	1.164	0.958	1.136	1.092	1.146	0.982	1.16
White	0.732	0.443	0.903	0.296	0.703	0.457	0.762	0.426	0.825	0.38
Black	0.089	0.284	0.01	0.098	0.095	0.293	0.098	0.297	0.058	0.234
Hispanic	0.131	0.337	0.055	0.228	0.152	0.359	0.103	0.303	0.079	0.27
Other	0.048	0.215	0.033	0.177	0.05	0.218	0.037	0.19	0.038	0.191
Age 18-19	0.031	0.173	0.025	0.156	0.027	0.161	0.023	0.151	0.025	0.158
Age 25-29	0.12	0.325	0.108	0.311	0.126	0.331	0.072	0.259	0.109	0.311
Age 30-34	0.138	0.345	0.136	0.343	0.14	0.347	0.113	0.316	0.123	0.329
Age 35-39	0.144	0.351	0.173	0.379	0.147	0.354	0.147	0.354	0.145	0.352
Age 40-44	0.143	0.35	0.161	0.367	0.145	0.352	0.185	0.388	0.155	0.362
Age 45-49	0.123	0.329	0.134	0.34	0.122	0.328	0.15	0.357	0.136	0.343
Age 50-54	0.096	0.294	0.074	0.262	0.099	0.298	0.114	0.318	0.117	0.322
Age 55-59	0.067	0.25	0.061	0.239	0.064	0.246	0.079	0.27	0.076	0.265
Age 60-64	0.04	0.196	0.038	0.19	0.043	0.204	0.048	0.214	0.04	0.195
Less than 9 grade	0.039	0.195	0.027	0.162	0.033	0.179	0.017	0.129	0.031	0.173
Grade 9-11	0.068	0.252	0.066	0.249	0.053	0.224	0.045	0.208	0.048	0.214
High school	0.344	0.475	0.328	0.469	0.348	0.476	0.303	0.46	0.289	0.453
Some college	0.272	0.445	0.306	0.461	0.231	0.422	0.254	0.435	0.238	0.426
College or more	0.265	0.441	0.266	0.442	0.328	0.47	0.362	0.481	0.383	0.486
Real Hourly Wage	18.93	16.97	17.57	11.55	21.45	15.98	24.79	22.42	23.55	21.65
Real Hourly Wage–Decile 1	4.97	0.97	4.97	0.97	4.98	0.97	4.96	1.00	4.88	0.95
Real Hourly Wage–Decile 2	6.21	1.42	6.30	1.44	6.26	1.40	6.28	1.48	6.17	1.40
State Minimum Wage	3.87	1.75	4.06	0.70	4.56	0.39	6.35	0.73	6.08	0.75
Real State Minimum Wage	4.81	1.95	5.84	0.70	6.05	0.28	6.98	0.52	6.80	0.51
Federal Minimum Wage	4.51	0.67	3.92	0.37	4.25	0.00	5.15	0.00	5.15	0.00
Real Federal Minimum Wage	5.66	0.26	5.66	0.23	5.642	0.243	5.69	0.27	5.79	0.30
Number of Observations	1,259,587		2,769		9,101		4,642		6,365	

Table A.2: Health Insurance Coverage Rates by Firm Size

Firm Size	Obs	Mean
Less than 25	362,609	31.3%
25-99	160,601	58.0%
100-499	173,759	68.2%
500-999	69,726	71.3%
1000 and more	468,346	73.5%

Table A.3: Health Insurance Coverage Rates by Occupations

Occupation	Obs	Mean
Profesionals	269,457	69.5%
Managers	181,806	66.2%
Operatives	135,066	61.1%
Craftsmen	131,035	60.8%
Sales	75,874	51.3%
Laborers	48,932	44.8%
Service	167,223	38.9%
Farmers	20,574	20.3%
Other occupations	18,783	9.0%

Table A.4: Health Insurance Coverage Rates by Industry

Industry	Obs	Mean
Public Administration	68,680	82.1%
Durable Goods	116,475	77.7%
Transport & utilities	72,888	72.9%
Non-durable Goods	76,264	71.9%
Finance	82,346	65.9%
Services	451,255	55.4%
Trade	244,043	44.6%
Agriculture	32,886	24.2%
Other Industry	24,455	10.3%

Table A.5: Federal and State Minimum Wage History

Year	1988	1991	1992	1994	1996	1997	1998	2000	2001	2002	2003	2004
Federal	3.35	3.8	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Alabama	-	-	-	-	-	-	-	-	-	-	-	-
Alaska	3.85	4.3	4.75	4.75	4.75	5.25	5.65	5.65	5.65	5.65	7.15	7.15
Arizona												
Arkansas	3.25	3.35	3.65	4.25	4.25	4.25	5.15	5.15	5.15	5.15	5.15	5.15
California	3.35	4.25	4.25	4.25	4.25	4.75	5.15	5.75	6.25	6.75	6.75	6.75
Colorado	3	3	3	3	3	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Connecticut	3.75	4.25	4.27	4.27	4.27	4.77	5.18	6.15	6.4	6.7	6.9	7.1
Delaware	3.35	3.8	4.25	4.25	4.65	5	5.15	5.65	6.15	6.15	6.15	6.15
DC	3.5-4.85	3.70-4.85	3.90-5.45	4.25	5.25	5.75	6.15	6.15	6.15	6.15	6.15	6.15
Florida	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	5.15	5.15	5.15
Hawaii	3.85	3.85	3.85	5.25	5.25	5.25	5.25	5.25	5.25	5.75	6.25	6.25
Idaho	2.3	3.8	4.25	4.25	4.25	4.25	5.15	5.15	5.15	5.15	5.15	5.15
Illinois	3.35	3.8	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.5
Indiana	2	3.35	3.35	3.35	3.35	3.35	3.35	5.15	5.15	5.15	5.15	5.15
Iowa		4.25	4.65	4.65	4.65	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Kansas	1.6	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
Kentucky	3.35	3.8	4.25	4.25	4.25	4.25	4.25	5.15	5.15	5.15	5.15	5.15
Louisiana	-	-	-	-	-	-	-	-	-	-	-	-
Maine	3.65	3.85	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.75	6.25	6.25
Maryland	3.35	3.8	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Massachusetts	3.65	3.75	4.25	4.25	4.75	5.25	5.25	6	6.75	6.75	6.75	6.75
Michigan	3.35	3.35	3.35	3.35	3.35	3.35	5.15	5.15	5.15	5.15	5.15	5.15
Minnesota	3.55-3.5	4.25	4.25	4.25	4.25	4.25	5.15	4.9-5.15	4.9-5.15	4.9-5.15	4.9-5.15	4.9-5.15
Mississippi	-	-	-	-	-	-	-	-	-	-	-	-
Missouri		3.8	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Montana	3.35	3.8	4.25	4.25	4.25	4.75	5.15	4-5.15	4-5.15	4-5.15	4-5.15	4-5.15
Nebraska	3.35	3.35	4.25	4.25	4.25	4.25	5.15	5.15	5.15	5.15	5.15	5.15
Nevada	3.35	3.8	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
New Hampshire	3.55	3.85	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
New Jersey	3.35	3.8	4.25/5.0 5	5.05	5.05	5.05	5.05	5.15	5.15	5.15	5.15	5.15
New Mexico	3.35	3.35	3.35	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	5.15
New York	3.35	3.8	4.25	4.25	4.25	4.25	4.25	4.25	5.15	5.15	5.15	5.15
North Carolina	3.35	3.35	3.8	4.25	4.25	4.25	5.15	5.15	5.15	5.15	5.15	5.15
North Dakota	2.8-3.1	3.4	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Ohio	2.3	3.8	4.25	4.25	4.25	4.25	4.25	2.8-4.25	2.8-4.25	2.8-4.25	2.8-4.25	2.8-4.25
Oklahoma	3.35	3.8	4.25	4.25	4.25	4.75	5.15	2-5.15	2-5.15	2-5.15	2-5.15	2-5.15
Oregon	3.35	4.75	4.75	4.75	4.75	5.5	6	6.5	6.5	6.5	6.9	7.05
Pennsylvania	3.35	3.85	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Rhode Island	3.65	4.25	4.45	4.45	4.45	5.15	5.15	5.65	6.15	6.15	6.15	6.75
South Carolina	-	-	-	-	-	-	-	-	-	-	-	-

Table A.5: (Continued)

South Dakota	2.8	3.8	4.25	4.25	4.25	4.25	5.15	5.15	5.15	5.15	5.15	5.15
Tennessee	-	-	-	-	-	-	-	-	-	-	-	-
Texas	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	5.15	5.15	5.15
Utah	2.75	3.8	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Vermont	3.55	3.85	4.25	4.25	4.75	5	5.25	5.75	6.25	6.25	6.25	6.75
Virginia	2.65	2.65	3.65	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Washington	2.3	4.25	4.25	4.25	4.9	4.9	4.9	6.5	6.72	6.9	7.01	7.16
West Virginia	3.35	3.35	3.8	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15
Wisconsin	3.35	3.8	3.8	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15
Wyoming	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	5.15	5.15	5.15

Note: Changes in basic minimum wages in non-farm employment under state law: Selected years, 1988 to 2004, as of January 1 of the year, unless otherwise stated.

Table A.6: Federal Minimum Wage Changes

Date	Value
Jan-87	3.35
Apr-90	3.80
Apr-91	4.25
Oct-96	4.75
Sep-97	5.15
Jan-01	5.15

Notes: At the federal level, I use three years prior to the change and three years after. In this table I only report the actual changes in minimum wage, and the level at the beginning and at the end of the period analyzed. I selected two changes: 1990-1991 and 1996-1997. The window for each change is 1987-1989 and 1992-1994 for the first changes, and 1994-1996 and 1999-2001 for the second changes.

Table A.7: Oregon Case Study

State or Jurisdiction	1989	1990	1991	1992	1993
Oregon	3.35	4.25	4.75	4.75	4.75
California	4.25	4.25	4.25	4.25	4.25
Idaho	2.30	3.80	3.80	4.25	4.25
Nevada	3.35	3.35	3.80	4.25	4.25
Washington	3.85	4.25	4.25	4.25	4.25
Federal	3.35	3.35	3.80	4.25	4.25

Notes: I report the state minimum wages for Oregon, for its neighbors, and for the federal level. The shaded represent the years with a change in state minimum wage; two years prior to the change and two years after the change are also included in the tables.

Table A.8: New Jersey Case Study

State or Jurisdiction	1990	1991	1992	1993	1994
New Jersey	3.80	4.25	5.05	5.05	5.05
Delaware	3.80	4.25	4.25	4.25	4.65
Maryland	3.80	4.25	4.25	4.25	4.25
New York	3.80	4.25	4.25	4.25	4.25
Pennsylvania	3.80	4.25	4.25	4.25	4.25
Connecticut	3.80	4.27	4.27	4.27	4.27
Federal	3.80	4.25	4.25	4.25	4.25

Notes: I report the state minimum wages for New Jersey, for its neighbors, and for the federal level. The shaded represent the years with a change in state minimum wage; two years prior to the change and two years after the change are also included in the tables.

Table A.9: Connecticut Case Study

State or Jurisdiction	1998	1999	2000	2001	2002	2003
Connecticut	5.18	5.18	6.15	6.40	6.70	6.90
New Jersey	5.05	5.05	5.15	5.15	5.15	5.15
Rhode Island	5.15	5.15	5.65	6.15	6.15	6.15
New York	4.25	4.25	4.25	5.15	5.15	5.15
Federal	5.15	5.15	5.15	5.15	5.15	5.15

Notes: I report the state minimum wages for Connecticut, for its neighbors, and for the federal level. The shaded represent the years with a change in state minimum wage; two years prior to the change and two years after the change are also included in the tables.

Table A.10: Massachusetts Case Study

State or Jurisdiction	1998	1999	2000	2001	2002	2003
Massachusetts	5.25	5.25	6.00	6.75	6.75	6.75
Rhode Island	5.15	5.15	5.65	6.15	6.15	6.15
New York	4.25	4.25	4.25	5.15	5.15	5.15
New Hampshire	5.15	5.15	5.15	5.15	5.15	5.15
Vermont	5.25	5.25	5.75	6.25	6.25	6.25
Federal	5.15	5.15	5.15	5.15	5.15	5.15

Notes: I report the state minimum wages for Massachusetts, for its neighbors, and for the federal level. The shaded represent the years with a change in state minimum wage; two years prior to the change and two years after the change are also included in the tables.

Appendix B

Sample Size and Coverage Rates Corresponding to Each Case Study

Table B.1: Early 90s Federal Level Coverage Rates of Employment-Based Health Insurance and the Sample Size

		Treatment Group Workers				Control Group Workers			
		Before		After		Before		After	
Sample	Wage	Rates	#Obs	Rates	#Obs	Rates	#Obs	Rates	#Obs
Everyone	**10%**	19.30%	12,745	19.40%	12,443	61.60%	185,711	59.50%	180,356
Age<40	**10%**	17.20%	9,295	17.00%	8,866	59.00%	108,014	55.60%	97,717
Fsize25	**10%**	13.40%	5,425	12.30%	5,045	33.30%	51,687	32.50%	50,641
Fsize25 &age	**10%**	11.80%	3,666	10.10%	3,342	33.30%	29,173	31.30%	26,388
White	**10%**	19.60%	9,010	20.10%	8,184	62.80%	146,090	61.20%	137,796
Black	**10%**	21.40%	1,457	23.90%	1,320	63.40%	14,877	60.50%	14,443
Hispanic	**10%**	16.10%	1,884	15.10%	2,418	52.10%	18,642	48.90%	20,595
Other	**10%**	19.50%	394	18.40%	521	57.30%	6,102	57.20%	7,522
Everyone	**20%**	27.80%	12,533	30.10%	15,571	62.40%	169,399	62.80%	201,256
Age<40	**20%**	24.20%	8,751	25.70%	10,354	58.50%	89,596	58.50%	98,454
Fsize25	**20%**	17.50%	5,130	17.70%	6,050	34.40%	46,942	36.10%	54,770
Fsize25&age	**20%**	15.30%	3,315	15.00%	3,826	33.00%	23,904	34.70%	25,719
White	**20%**	28.50%	7,960	30.90%	8,928	63.90%	127,496	64.40%	141,836
Black	**20%**	33.60%	1,332	38.30%	1,737	64.50%	14,017	65.50%	19,121
Hispanic	**20%**	22.90%	2,636	24.90%	4,091	52.50%	20,620	53.00%	29,713
Other	**20%**	27.20%	605	30.30%	815	59.70%	7,266	61.00%	10,586

Note: This table corresponds to Table 1.

Table B.2: Late 90s Federal Level Coverage Rates of Employment-Based Health Insurance and the Sample Size

		Treatment Group Workers				Control Group Workers			
		Before		After		Before		After	
Sample	Wage	Rates	#Obs	Rates	#Obs	Rates	#Obs	Rates	#Obs
Everyone	**10%**	22.1%	12,533	24.1%	15,571	59.9%	169,399	60.4%	201,256
Age<40	**10%**	18.8%	8,751	19.7%	10,354	55.4%	89,596	55.5%	98,454
Fsize25	**10%**	14.7%	5,130	14.6%	6,050	33.0%	46,942	34.5%	54,770
Fsize25 &age	**10%**	12.1%	3,315	12.0%	3,826	31.2%	23,904	32.5%	25,719
White	**10%**	22.7%	7,960	24.8%	8,928	61.7%	127,496	62.5%	141,836
Black	**10%**	28.2%	1,332	32.2%	1,737	61.9%	14,017	63.3%	19,121
Hispanic	**10%**	17.2%	2,636	18.7%	4,091	48.9%	20,620	49.4%	29,713
Other	**10%**	21.5%	605	25.9%	815	57.3%	7,266	58.6%	10,586
Everyone	**20%**	27.8%	26,831	30.1%	33,001	62.4%	155,103	62.8%	183,828
Age<40	**20%**	24.2%	18,161	25.7%	21,255	58.5%	80,188	58.5%	87,555
Fsize25	**20%**	17.5%	10,030	17.7%	11,760	34.4%	42,044	36.1%	49,062
Fsize25&age	**20%**	15.3%	6,443	15.0%	7,308	33.0%	20,778	34.7%	22,239
White	**20%**	28.5%	17,180	30.9%	18,793	63.9%	118,278	64.4%	131,973
Black	**20%**	33.6%	2,765	38.3%	3,686	64.5%	12,586	65.5%	17,174
Hispanic	**20%**	22.9%	5,633	24.9%	8,789	52.5%	17,625	53.0%	25,017
Other	**20%**	27.2%	1,256	30.3%	1,736	59.7%	6,617	61.0%	9,667

Note: This table corresponds to Table 2.

Table B.3: Oregon Coverage Rates of Employment-Based Health Insurance and the Sample Size

		Treatment Group Workers				Control Group Workers			
		Before		After		Before		After	
Sample	Wage	Rates	#Obs	Rates	#Obs	Rates	#Obs	Rates	#Obs
Everyone	**10%**	17.3%	1,124	14.5%	1,070	57.8%	17,681	56.6%	15,850
Age<40	**10%**	18.1%	852	12.5%	789	53.9%	10,610	52.5%	8,966
Fsize25	**10%**	11.8%	533	8.1%	457	30.0%	5,372	28.3%	4,765
Fsize25 &age	**10%**	11.7%	368	6.9%	318	28.3%	3,178	26.7%	2,619
White	**10%**	19.9%	602	16.6%	465	61.8%	11,258	60.9%	9,772
Black	**10%**	27.8%	18	20.0%	30	67.5%	680	60.2%	548
Hispanic	**10%**	14.6%	444	12.2%	509	47.2%	4,471	45.9%	4,201
Other	**10%**	8.3%	60	15.2%	66	55.3%	1,272	56.5%	1,329
Everyone	**20%**	21.2%	2,579	21.8%	2,346	60.8%	16,226	59.1%	14,574
Age<40	**20%**	20.3%	1,934	20.3%	1,736	57.6%	9,528	55.5%	8,019
Fsize25	**20%**	12.6%	1,065	11.1%	934	31.8%	4,840	29.9%	4,288
Fsize25&age	**20%**	12.1%	754	10.8%	674	30.4%	2,792	28.6%	2,263
White	**20%**	25.3%	1,298	25.1%	996	63.9%	10,562	62.6%	9,241
Black	**20%**	33.3%	42	22.1%	68	68.6%	656	62.9%	510
Hispanic	**20%**	16.5%	1,092	18.3%	1,108	52.2%	3,823	49.6%	3,602
Other	**20%**	17.0%	147	24.7%	174	57.6%	1,185	58.8%	1,221

Note: This table corresponds to Table 3.

Table B.4: New Jersey Coverage Rates of Employment-Based Health Insurance and the Sample Size

		Treatment Group Workers				Control Group Workers			
		Before		After		Before		After	
Sample	Wage	Rates	#Obs	Rates	#Obs	Rates	#Obs	Rates	#Obs
Everyone	**10%**	19.9%	1,161	18.8%	1,034	64.7%	22,753	63.7%	21,147
Age<40	**10%**	17.1%	761	15.5%	701	61.9%	12,279	59.5%	10,980
Fsize25	**10%**	11.9%	503	15.8%	419	38.4%	5,793	38.7%	5,499
Fsize25 &age	**10%**	9.8%	315	12.1%	281	38.2%	3,039	37.8%	2,874
White	**10%**	18.9%	774	19.6%	672	66.1%	17,175	65.6%	15,636
Black	**10%**	29.2%	130	19.3%	119	64.9%	2,639	63.1%	2,477
Hispanic	**10%**	18.0%	206	12.8%	187	57.1%	2,227	51.9%	2,190
Other	**10%**	19.6%	51	26.8%	56	53.7%	712	59.0%	844
Everyone	**20%**	27.5%	2,540	25.4%	2,405	66.7%	21,374	66.0%	19,776
Age<40	**20%**	24.5%	1,674	22.5%	1,585	64.4%	11,366	62.2%	10,096
Fsize25	**20%**	18.6%	980	15.6%	884	39.6%	5,316	40.9%	5,034
Fsize25&age	**20%**	15.8%	626	13.1%	581	40.0%	2,728	40.6%	2,574
White	**20%**	27.6%	1,679	28.1%	1,536	67.8%	16,270	67.5%	14,772
Black	**20%**	35.4%	316	23.1%	316	66.9%	2,453	66.3%	2,280
Hispanic	**20%**	22.1%	439	17.7%	436	60.7%	1,994	55.8%	1,941
Other	**20%**	23.6%	106	26.5%	117	55.9%	657	61.6%	783

Note: This table corresponds to Table 4.

Table B.5: Connecticut Coverage Rates of Employment-Based Health Insurance and the Sample Size

		Treatment Group Workers				Control Group Workers			
		Before		After		Before		After	
Sample	Wage	Rates	#Obs	Rates	#Obs	Rates	#Obs	Rates	#Obs
Everyone	**10%**	20.2%	806	21.7%	1,259	59.8%	12,873	59.5%	19,425
Age<40	**10%**	16.9%	526	17.0%	811	55.2%	6,371	54.0%	8,555
Fsize25	**10%**	13.9%	346	12.9%	533	35.5%	3,483	36.3%	5,512
Fsize25 &age	**10%**	13.3%	226	9.5%	328	33.9%	1,703	31.9%	2,338
White	**10%**	21.7%	405	22.7%	652	63.4%	8,742	61.8%	13,421
Black	**10%**	25.2%	115	24.3%	202	58.4%	1,473	60.4%	2,260
Hispanic	**10%**	13.9%	245	17.8%	315	48.1%	2,115	47.0%	2,513
Other	**10%**	29.3%	41	22.2%	90	52.1%	543	57.4%	1,231
Everyone	**20%**	24.5%	1,712	27.6%	2,602	62.2%	11,967	61.4%	18,082
Age<40	**20%**	21.7%	1,080	23.6%	1,587	58.0%	5,817	56.3%	7,779
Fsize25	**20%**	14.0%	666	15.7%	1,036	37.7%	3,163	38.0%	5,009
Fsize25&age	**20%**	14.1%	418	12.7%	598	36.3%	1,511	33.8%	2,068
White	**20%**	27.4%	860	28.5%	1,346	65.1%	8,287	63.3%	12,727
Black	**20%**	28.0%	250	31.4%	398	61.2%	1,338	62.4%	2,064
Hispanic	**20%**	18.4%	522	24.0%	653	52.0%	1,838	49.7%	2,175
Other	**20%**	22.5%	80	25.9%	205	55.0%	504	60.3%	1,116

Note: This table corresponds to Table 5.

Table B.6: Massachusetts Coverage Rates of Employment-Based Health Insurance and the Sample Size

		Treatment Group Workers				Control Group Workers			
		Before		After		Before		After	
Sample	Wage	Rates	#Obs	Rates	#Obs	Rates	#Obs	Rates	#Obs
Everyone	**10%**	21.6%	819	22.1%	1,373	58.4%	13,099	58.1%	20,656
Age<40	**10%**	17.9%	541	16.2%	879	53.8%	6,514	52.7%	9,152
Fsize25	**10%**	15.5%	329	16.3%	609	35.3%	3,695	35.7%	6,166
Fsize25 &age	**10%**	13.4%	209	11.6%	372	33.4%	1,786	31.8%	2,629
White	**10%**	24.0%	483	23.7%	869	61.3%	9,945	59.8%	16,168
Black	**10%**	22.7%	97	21.7%	152	56.1%	1,068	58.0%	1,597
Hispanic	**10%**	13.9%	201	17.5%	257	44.8%	1,594	46.4%	1,864
Other	**10%**	28.9%	38	21.1%	95	49.2%	492	53.2%	1,027
Everyone	**20%**	25.8%	1,783	26.8%	2,771	60.7%	12,135	60.1%	19,258
Age<40	**20%**	22.9%	1,152	21.2%	1,671	56.5%	5,903	55.2%	8,360
Fsize25	**20%**	15.5%	656	17.1%	1,121	37.3%	3,368	37.2%	5,654
Fsize25&age	**20%**	15.2%	414	12.6%	641	35.5%	1,581	33.8%	2,360
White	**20%**	28.6%	1,082	28.5%	1,763	63.1%	9,346	61.4%	15,274
Black	**20%**	27.7%	202	27.3%	300	58.7%	963	60.5%	1,449
Hispanic	**20%**	18.2%	422	22.3%	512	48.4%	1,373	49.4%	1,609
Other	**20%**	23.4%	77	22.4%	196	51.9%	453	56.4%	926

Note: This table corresponds to Table 6.